

**Oroville Facilities Relicensing Efforts
Draft Narrative Reports for PM&E Discussion**

Resource Action: EWG-86A

Task Force Recommendation Category: 2

RECREATION AREA WATER QUALITY MONITORING AND IMPROVEMENT

Description of Potential Resource Action:

Monitoring conducted under SPW1 and SPW3 at designated recreation areas and highly used undeveloped swim areas at the Oroville Facilities has identified bacterial levels that exceed criteria for the protection of human health developed by the California Department of Health Services and U.S. Environmental Protection Agency, and objectives of the Basin Plan developed by the Central Valley Regional Water Quality Control Board. Protection of public health and adherence to Basin Plan standards warrants routine bacterial monitoring of swim areas and implementation of methods to reduce water contamination.

Routine bacterial monitoring would be conducted at developed and highly used undeveloped swim areas, including Loafer Creek, Monument Hill, North Forebay, and South Forebay recreation areas, and Foreman Creek, South Forebay, and Stringtown boat launch areas and Mile Long Pond. Bacteria monitored would include total coliform, fecal coliform, *E. coli*, and enterococcus. Additional monitoring would be implemented in areas experiencing high bacterial densities and wildlife use to distinguish human and wildlife sources. Monitoring would be conducted during the recreation season from June through September. Methods of public notification of contaminated beaches would be developed, which may include press releases and posting of warning signs.

A program would be developed to provide educational material to the public to reduce contamination of beaches from human use. Such material would be disseminated through press releases or posted on permanently installed billboards at developed swim areas and temporary billboards at undeveloped swim areas. Methods of reducing wildlife use of swim areas would be investigated, and, if feasible, a program would be implemented to reduce wildlife use of swim areas at the Oroville Facilities.

Nexus to Project:

Recreation is one of the designated beneficial uses of the Oroville Facilities. Designated swim areas have been developed as part of the recreational features of the Project. Other areas of the Oroville Facilities, for which there is good access, also receive significant recreational swimming activity.

The Basin Plan designates contact recreation as one of the existing beneficial uses of Lake Oroville (CVRWQCB 1998), and establishes objectives for bacteria levels.

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The California Department of Health Services developed draft guidance for protection of the public from bacterial contamination at freshwater beaches (DHS 2001). The U.S. Environmental Protection Agency has also developed national bacteria criteria for bathing (full body contact) recreational waters (USEPA 1986).

Potential Environmental Benefits:

Currently, the public is potentially exposed to pathogenic microorganisms at Project recreational facilities. In addition, project waters may not be complying with objectives of the Basin Plan or water quality criteria. Benefits of the resource action would be to:

1. protect public health from exposure to potentially harmful microorganisms
2. ensure the Project meets water quality requirements of the Basin Plan
3. enhance water quality in Project waters
4. enhance enjoyment of Project recreational features by providing increased assurance of water quality

Potential Constraints:

Potentially closing recreational areas due to elevated bacteria levels would adversely affect recreational opportunities. Wildlife use of recreational areas could increase bacterial contamination, resulting in swim area posting when little concern exists for human health effects.

Existing Conditions in the Proposed Resource Action Implementation Area:

The Oroville Facilities provides a variety of recreational opportunities, including boating, camping, hiking, picnicking, swimming, fishing, and hiking, biking, and horse riding trails. There are several developed recreation areas with swim beaches, and a variety of undeveloped areas popularly used for swimming. Developed recreation areas with swim beaches include the North Forebay, South Forebay, Loafer Creek, and Monument Hill Recreation Areas. Facilities at these developed recreation areas include restrooms and picnic areas. The South Forebay and Monument Hill Recreation Areas also have boat launches. Areas popularly used for swimming include the Foreman Creek, South Forebay, and Stringtown Boat Ramp and Mile Long Pond. Portable restrooms are available at most of these sites. Dispersed swimming occurs at many other areas of the Project where individual or several boats may anchor or beach and from day use of moored house boats.

During major summertime holidays, the number of people utilizing Project waters increases dramatically. Boat access sites are generally filled to capacity, while large

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numbers of families and groups of people use the developed recreation areas and popular access sites for swimming and picnicking.

As part of SPW1 and SPW3, recreation sites were monitored in 2002 and 2003 for bacteria levels. Developed swim areas sampled were the Loafer Creek, Monument Hill, North Forebay, and South Forebay Recreation Area swim beaches, while undeveloped areas included the Foreman Creek, South Forebay, and Stringtown boat access areas. Water samples were collected from recreation areas in 2002 during early to mid afternoon from a week before to a couple of weeks after the Labor Day weekend. Samples were collected during morning hours in 2003 approximately every other week from mid-June through September, except that samples were collected twice each week from two weeks before to two weeks after the Fourth of July weekend.



The North Forebay Recreation Area is enjoyed by many visitors, especially swimmers and picnickers

All the recreation areas monitored at least occasionally exceeded some of the bacteria criteria, including the DHS draft guidance for fresh water beaches. A few areas, such as the North Forebay Recreation Area, rather consistently exceeded the various criteria.

The Basin Plan uses thirty-day averages of bacteria densities for determination of contamination and whether objectives have been exceeded, which takes into account the fluctuation in organism densities over time. The DHS draft guidance for fresh water beaches, however, bases determinations upon the most recent single sample. The DHS draft guidance recommends that beaches be posted to warn the public of contamination or closed when indicator organisms exceed the criteria. The DHS recommended level of bacteria contamination to trigger beach posting or closure was exceeded at least once at each of the recreation areas monitored in 2003. The North Forebay Recreation Area exceeded the criteria from nearly every sample.

However, high densities of coliform or enterococcus bacteria do not necessarily indicate human contamination or possible impacts to human health. Coliform and

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enterococcus bacteria used in water quality studies to indicate fecal contamination are not generally pathogenic, and are found in a variety of warm-blooded animals. Birds using wetland and open water areas can excrete indicator bacteria in densities that would suggest a potential risk to human health, but birds do not carry the same



A variety of waterfowl and shorebirds make extensive use of the North Forebay Recreation Area throughout the year

types of pathogens as people (SWRCB 2001). While waterfowl and shorebirds were noted at nearly all of the recreation areas sampled during this survey, some areas, such as the North Forebay Recreation Area, receive exceptionally heavy use by these birds. All of the recreation areas monitored are accessible to a variety of wildlife that can contribute coliform and enterococcus bacteria.

Human contact with recreation waters is, of course, another potential source. Diaper-wearing infants, especially, are a notorious source of fecal contribution to beach waters.

Design Considerations and Evaluation:

The resource action would provide routine monitoring of swim areas using standard laboratory procedures for total and fecal coliform, *E. coli*, and enterococcus bacteria. Efforts to distinguish between human and wildlife sources of bacteria would require more elaborate procedures, and possibly entering into an inter-agency agreement with DHS to provide analytical services. Bacterial monitoring of recreational waters would begin each year in late spring when public use of swim areas increases, and continue into the late summer. Water samples for routine bacteria analyses would be collected during peak afternoon recreation use on a mid-week and week-end day, while efforts to distinguish sources of bacteria would be developed in consultation with DHS staff, but would probably be on a periodic basis.

Either existing or new aesthetically benign billboards would be used to post information on measures the recreating public should employ to reduce the possibility of water contamination. Additional signage would be employed, in

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consultation with DHS, to advise the public when elevated levels of bacteria exist and potential health risks.

Routine monitoring of bacteria levels would determine whether measures to protect water quality and public health are effective. Recreation area users would also be polled periodically to determine whether information provided by the billboards has been deemed to be effective in conveying proper activities to protect water quality at the swim areas. Wildlife use would be assessed prior and subsequent to implementation of discouragement methods to determine their effectiveness.

The resource action would be evaluated at the end of each recreation season to determine whether bacterial monitoring has been effective in identifying adverse water quality conditions, public education is effective, and wildlife use is discouraged. Activities would be re-evaluated each year to determine other or additional actions to improve effectiveness or if activities should be modified or discontinued.

Synergism and Conflicts:

Actions implemented by this resource action, such as posting swim areas to warn of elevated bacteria levels, may conflict with efforts to increase recreational use of Project facilities. However, such actions may also increase public enjoyment of Project recreational features by assuring the public that efforts are being implemented to protect public health and water quality.

Uncertainties:

The major uncertainty with this resource action will be the ability to deter wildlife use of recreation areas. While laboratory methods are available for distinguishing human and wildlife derived bacteria, some bacteria are common to both which could lead to unnecessary posting of swim areas for elevated levels of bacteria. This uncertainty will be incorporated into analysis of bacteria data, information provided to the public, and decisions to post warnings of elevated bacteria levels.

Cost Estimate:

Cost items associated with this resource action include sample collection, laboratory analyses, data evaluation, development and installation of billboards, information posting, and wildlife deterrent activities. Estimated operating costs for these activities are about \$50,000 per year.

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Recommendations:

Coliform and enterococcus bacteria have been found at both developed and undeveloped swim areas of the Oroville Facilities at levels that exceed criteria established by the DHS and USEPA and Basin Plan objectives established by the CVRWQCB. Routine monitoring is recommended for protection of public health and adherence to Basin Plan water quality standards. Methods to reduce bacterial contamination should be implemented, which include posting information about bacteria levels and acceptable activities to maintain water quality, and determent of wildlife use of swim areas.

Literature Cited:

DHS 2001. Draft Guidance for Fresh Water Beaches. California Department of Health Services. Sacramento, California.

CVRWQCB 1998. The Water Quality Control Plan (Basin Plan), Fourth Edition. California Regional Water Quality Control Board, Central Valley Region. Sacramento, California.

SWRCB 2001. California Beach Closure Report 2000. State Water Resources Control Board. Sacramento, California.

USEPA 1986. Ambient Water Quality Criteria for Bacteria – 1986. U.S. Environmental Protection Agency. EPA440/5-84-002.